

NISTIR 8280

**Ongoing Face Recognition  
Vendor Test (FRVT)  
Part 3: Demographic Effects**

**Annex 2 : Description and examples of images and  
metadata: Application portraits**

This document is an annex of NIST Interagency Report 8280:  
<https://doi.org/10.6028/NIST.IR.8280>

2019/12/19

**NIST**  
**National Institute of  
Standards and Technology**  
U.S. Department of Commerce

# 1 Application photos

- ▷ **Demographic composition:** A global population involved in immigrant and non-immigrant application processes. From that population we used individuals from 24 countries and grouped those into seven regions as follows:

- 1: Eastern Europe - Russia, Poland and Ukraine
- 2: Central America - Mexico, Honduras, El Salvador, Nicaragua
- 3: West Africa - Ghana, Liberia, Nigeria
- 4: The Caribbean - Haiti, Jamaica
- 5: East Africa - Ethiopia, Kenya, Somalia
- 6: South Asia - India, Iran, Iraq, Pakistan
- 7: East Asia - China, Japan, Korea, Philippines, Thailand, Vietnam

The countries were selected because a) they span the globe, b) there are high numbers of subjects and images in the parent dataset, and c) we consider the country of birth to be a reasonable proxy for race. This is true because these countries have seen relatively low levels of long-distance immigration. That assertion is itself variably true, for example Japan has seen lower levels of immigration than Mexico.

The country of birth label of course subsumes rich ethnic substructure within each country. For example although the Kinh group makes up approximately 85% of the population of Vietnam, there are at least 50 other ethnic groups. Whether localized ethnic structures are relevant to face recognition is not known. The results included in the main report, however, suggest that localized populations give higher false positive rates.

Our categorization of the countries into seven geographic regions itself has alternatives. We could have split East Asia into northern and southern components. Likewise, we could have formed a new group separating Iraq and Iran from the South Asian group.

Note that we do not need to assert that the country of birth is a proxy for race. We could proceed without mention of race, and the biometric error rates could still usefully be reported by just country of origin.

- ▷ **Capture standards:** The images are collected in an attended interview setting using dedicated capture equipment and lighting. The images are in reasonably good compliance with the ISO/IEC 39794-5 specifications. We determined this by visual inspection, for via application of automated quality or conformance tests. The images, at size 300x300 pixels, are somewhat smaller than indicated by ISO have size 300x300 pixels.

The images are all high-quality frontal portraits collected in immigration offices. All images have a white background and are in close approximation to ISO/IEC 39794-5 / ICAO specifications. As such, potential quality related drivers of high false match rates (such as blur) can be expected to be absent.

- ▷ **Encoding:** The images are encoded as ISO/IEC 10918 i.e. JPEG.
- ▷ **Compression:** Over a random sample of 1000 images, the images have compressed file sizes mean 42KB, median 58KB, 25-th percentile 15KB, and 75-th percentile 66KB. The implied bit-rates are mostly benign and superior to many e-Passports.
- ▷ **Example images:** The image shown in Figure 1 is representative of images in the actual set.



*Figure 1: The figure gives an example of the high quality application image type used in this report.*